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- B33C-0612: Evaluation of simulated biospheric carbon dioxide fluxes and atmospheric concentrations using global in situ observations

Wednesday, 14 December 2016

13:40 - 18:00

- Moscone South
- - Poster Hall

Atmospheric mixing ratios of carbon dioxide (CO₂) are largely controlled by anthropogenic emission sources and biospheric sources/sinks. Global biospheric fluxes of CO₂ are controlled by complex processes facilitating the exchange of carbon between terrestrial ecosystems and the atmosphere. These processes which play a key role in these terrestrial ecosystem-atmosphere carbon exchanges are currently not fully understood, resulting in large uncertainties in the quantification of biospheric CO₂ fluxes. Current models with these inherent deficiencies have difficulties simulating the global carbon cycle with high accuracy. We are developing a new modeling platform, GEOS-Chem-CASA by integrating the year-specific NASA-CASA (National Aeronautics and Space Administration - Carnegie Ames Stanford Approach) biosphere model with the GEOS-Chem (Goddard Earth Observation System-Chemistry) chemical transport model to improve the simulation of atmosphere-terrestrial ecosystem carbon exchange. We use NASA-CASA to explicitly represent the exchange of CO₂ between terrestrial ecosystem and atmosphere by replacing the baseline GEOS-Chem land net CO₂ flux and forest biomass burning CO₂ emissions. We will present the estimation and evaluation of these “bottom-up” land CO₂ fluxes, simulated atmospheric mixing ratios, and forest disturbance changes over the last decade. In addition, we will present our initial comparison of atmospheric column-mean dry air mole fraction of CO₂ predicted by the model and those retrieved from NASA’s OCO-2 (Orbiting Carbon Observatory-2) satellite instrument and model-predicted surface CO₂ mixing ratios with global in situ observations. This evaluation is the first step necessary for our future work planned to constrain the estimates of biospheric carbon fluxes through “top-down” inverse modeling, which will improve our understanding of the processes controlling atmosphere-terrestrial ecosystem greenhouse gas exchanges, especially over regions which lack in situ observations.

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